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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/524,525	08/18/2005	Martin Hausner	BEET-09	1134
26875 7590 02/08/2011 WOOD, HERRON & EVANS, LLP 2700 CAREW TOWER 441 VINE STREET CINCINNATI, OH 45202				
EXAMINER				
AHMED, SIAMIM				
ART UNIT		PAPER NUMBER		
1713				
MAIL DATE		DELIVERY MODE		
02/08/2011		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/524,525

Applicant(s)

HAUSNER, MARTIN

Examiner

Shamim Ahmed

Art Unit

1713

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 January 2011.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 24-45 and 49-57 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 24-45 and 49-57 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Transposition of Patent Drawing Review (PTO-940)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB-08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 1/13/2011 has been entered.

Response to Arguments

2. Applicant's arguments with respect to claims 24-45 and 49-50 have been considered but are moot in view of the new ground(s) of rejection.

As to Yin et al (6,270,617), applicant's argument of teaching away from the present invention is not persuasive as to the point that *Yin et al not only teach etching metal layer such as aluminum but also clearly teach that the etching process can be selected for at least one of metal (aluminum) etching; a silicon oxide etching, polysilicon, silicide etc. (col.2, lines 54-58).*

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 24-45 and 49-57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Song et al (6,821,901) in view of Yin et al (6,270,617) as supported with Cleeves et al (5,091,047).

Song et al disclose a silicon etching process utilizing an inductively coupled plasma etching through a masking layer of aluminum, wherein the etching is dry etching and the etching is performed in Bosch process such as etching and passivation steps are carried out alternatively (col.5, lines 50-col.6, line 7).

Song et al teach the etching create an etched cavity of about 250 μm deep (col.6, lines 7-9).

Song remains silent regarding the introduction of the inductively coupling power provided by an inductive coupling coil in the form of a cylinder and having a lower edge.

Song et al may differs from the instant invention in that the substrate is kept at a distance of at least twice the mean free path length of the plasma atoms or at least 8 cm from the inductive coupling.

However, **Yin et al** teach an etching process for etching silicon oxide layer (silicon containing as claimed) by placing the inductive coil antenna in the form of cylinder for adjusting the shape of the plasma ion density in order have uniformity of plasma ions, wherein the coil obviously having a lower edge as of figure 1 (col.6, lines 3-52 and lines 56-67).

Yin et al also teach that a distance is maintained between the substrate and the lower edge of the coil at approximately 10 cm (col.7, lines 16-23), which easily reads on the limitation of at least 8 cm (the claimed lower range).

Yin et al disclose a RF plasma reactor having induction coil above the substrate to be processed and also illustrate that **the distance between the substrate and the inductive coil provides major roles in the plasma uniformity by increasing the ion density across the wafer surface; the distance between the ceiling and the substrate is with in the range of 4-12 inches, which equates 10-30 cm** (col.1, lines 20-24 and col.2, lines 61-67), and the aforementioned reads on the claimed limitation of the substrate is kept at a distance from the inductive coupling----- or at a distance of at least 8 cm from the inductive coupling.

In the above, Yin et al teach *that the etching process can be selected for at least one of metal etching (aluminum); a silicon oxide etching, polysilicon, silicide etc. (col.2, lines 54-58).*

It would have been obvious to utilizing a metal (aluminum) masking layer in order to etch silicon containing layer with a desired pattern as supported by Cleeves et al and as well as taught by Song et al above..

Cleeves et al teach that the primary layer is an organic or inorganic dielectric and the metal image layer is aluminum the aluminum is wet or dry etched using the thin layer resist as a mask, and the patterned aluminum layer in turn acts as a mask for plasma etching the dielectric. A fluorine plasma etch is typically used with inorganic

dielectric layers, such as silicon oxide and silicon nitride, while an oxygen plasma may be used with organic polymeric dielectrics (col.1, lines 62-col.2, line 2).

So, one of ordinary skilled in the art at the time of claimed invention would have been motivated to etch the silicon containing layer using an aluminum masking layer as suggested by Cleeves and also Song et al.

Therefore, it would have been obvious to one of ordinary skilled in the art at the time of claimed invention to employ Yin et al's teaching as supported by Cleeves et al into Song et al's process for producing uniform plasma on the surface regions as taught by Yin et al.

As to claims 26 and 52, Yin et al teach the pressure can be varied to control the ion distribution across the wafer surface and that could be about 10 mTorr or less than 20 mTorr (col.11, lines 44-53), which reads on the claim pressure range.

As to claim 27, depositing the material all the way across to the other side of the substrate is merely one of several obvious possibilities from which a person skilled in the art would select according to the circumstances as illustrates in Song et al

As to claim 30, Song et al teach that aluminum is vapor deposited by generally known method such as PVD (col.5, lines 19-21).

As to claims 49- 50, 54-55, it would have been obvious to one ordinary skilled in the art at the time of claimed invention to optimize the etched depth and the etched amount that would have been dependent on the type of device to be formed.

As to claims 28 and 53, Cleeves et al teach the thickness of the aluminum layer 14 is sufficiently thick to act as a mask during subsequent etching the primary dielectric

(silicon oxide) layer, wherein the thickness is in the range of about 100 to 1000 angstroms, which equates 0.01 to about 0.1 μm (col.2, lines 60-66).

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Kumar (5,382,315) discloses a general teaching of etching silicon containing (dielectric) layer using a metal (aluminum) masking layer and vise-versa (col.4, lines 17-28).

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shamim Ahmed whose telephone number is (571) 272-1457. The examiner can normally be reached on Mon-Thurs day (7:00-3:30) Every Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine G. Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Shamim Ahmed
Primary Examiner
Art Unit 1713

SA
February 7, 2011

/Shamim Ahmed/
Primary Examiner, Art Unit 1713